

EXHIBIT I

1 IN THE UNITED STATES DISTRICT COURT FOR THE
2 NORTHERN DISTRICT OF OKLAHOMA
3
4
5 W. A. DREW EDMONDSON, in his)
6 capacity as ATTORNEY GENERAL)
7 OF THE STATE OF OKLAHOMA and)
8 OKLAHOMA SECRETARY OF THE)
9 ENVIRONMENT C. MILES TOLBERT,))
10 in his capacity as the)
11 TRUSTEE FOR NATURAL RESOURCES))
12 FOR THE STATE OF OKLAHOMA,)
13))
14 Plaintiff,)
15))
16 vs.) 4:05-CV-00329-TCK-SAJ
17))
18 TYSON FOODS, INC., et al,)
19))
20 Defendants.)
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14 THE VIDEOTAPED DEPOSITION OF
15 VALERIE HARDWOOD, PhD, produced as a witness on
16 behalf of the Defendants in the above styled and
17 numbered cause, taken on the 18th day of July, 2008,
18 in the City of Tulsa, County of Tulsa, State of
19 Oklahoma, before me, Lisa A. Steinmeyer, a Certified
20 Shorthand Reporter, duly certified under and by
21 virtue of the laws of the State of Oklahoma.
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1 A Of course, I've done some additional data
2 analysis for the report.

3 Q Right, and you submitted a report?

4 A Correct.

5 Q We talked at your last deposition -- you 09:09AM

6 talked at your last deposition a bit about fate and
7 transport, and let me just run through some

8 characteristics here, and I hope we can take care of
9 these pretty quickly. Since your prior deposition,

10 have you conducted any study of the fate and 09:09AM

11 transport characteristics of any bacterium in the
12 Illinois River watershed?

13 A No, I have not.

14 Q So you have not studied how bacteria is
15 affected by temperature? 09:09AM

16 A No.

17 Q Desiccation?

18 A No.

19 Q Predation?

20 A No. 09:09AM

21 Q Osmotic pressure?

22 A No.

23 Q UV exposure?

24 A No.

25 Q pH balance? 09:09AM

10

1 A No.

2 Q Nutrient availability?

3 A No.

4 Q Have you studied how the movement of any

5 particular bacterium in the IRW is affected by its 09:09AM

6 size?

7 A No, I have not.

8 Q Its shape?

9 A No.

10 Q It's surface charge? 09:10AM

11 A No.

12 Q Location in the water column?

13 A No.

14 Q Presence of vegetation?

15 A No. 09:10AM

16 Q The media it's moving through?

17 A No.

18 Q Have you cultured the Brevibacterium that you

19 identified through your PCR process?

20 A No. 09:10AM

21 Q Why not?

22 A There has been no need to culture the

23 Brevibacterium.

24 Q Have you identified it any more specifically

25 than to say it's 98 percent consistent with 09:10AM

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11

1 Brevibacteria avium?

2 A No.

3 Q And if you haven't cultured, I assume you also
4 have not studied its fate and transport
5 characteristics?

09:10AM

6 A That's correct.

7 Q Now, what you refer to as the marker, the
8 biomarker in your term, what you're actually
9 referring to is actually the DNA sequence that's
10 contained by the Brevibacterium; is that correct?

09:10AM

11 A That is correct. We're referring to the DNA
12 sequence, yes.

13 Q Okay. For clarity, I'm going to attempt to be
14 consistent referring to the Brevibacterium as the
15 PCR Brevibacterium and the sequence as the PCR
16 sequence. Will those terms make sense to you? I
17 just want to distinguish the two.

09:10AM

18 A Well, it's really a DNA sequence, so I
19 guess --

20 Q We can call it the DNA sequence.

09:11AM

21 A DNA sequence.

22 Q If I refer to that, then we're talking about
23 what you would refer to as the biomarker?

24 A Yes.

25 Q Now, we previously discussed or at your last

09:11AM

1 deposition you discussed that when a bacteria dies,
2 its DNA remains in the environment for some period
3 of time after that. Do you recall that?

4 A Yes, it can remain for some period of time.

5 Q Do you know how long the DNA sequence at issue 09:11AM
6 in this case can remain in nature apart from the
7 Brevibacterium that carries it?

8 A Typically in nature, bacterial DNA is rapidly
9 degraded within -- and it depends on the
10 environment, but within a matter of hours to several 09:11AM
11 days.

12 Q Okay. You said it depends on the environment.

13 A Correct.

14 Q What kind of characteristics affect how
15 quickly the DNA degrades? 09:11AM

16 A Characteristics would include the amount of
17 ultraviolet radiation. It would include the amount
18 of pred -- or not predation but the amount of
19 organisms that would consume that DNA because
20 they'll use it as a food source. So it would depend 09:12AM
21 on the trophic level. So in a more eutrophic
22 nutrient dense environment, then that DNA would
23 probably be consumed more quickly than in a more
24 allegatory thick environment.

25 Q Can DNA move in the environment after the 09:12AM

1 bacteria that carried it had died, become inactive?

2 A DNA could be transported along with water,
3 yes.

4 Q Could it move in any other way?

5 A It would not be able to be motile on its own. 09:12AM

6 So it would have to be transported by the movement
7 of water or some other matrix.

8 Q Okay. Let's talk briefly about sources of
9 bacteria in the IRW. Since your last deposition,
10 have you studied sources in the IRW, apart from 09:13AM
11 poultry, of any -- of fecal indicator bacteria?

12 A I have not.

13 Q Okay. Has anyone associated with the State's
14 case?

15 A Roger Olsen of CDM has done some work with 09:13AM
16 bacteria in cow manure.

17 Q Okay. Are you familiar with the nature of his
18 work?

19 A I have read his report, yes.

20 Q Have you studied any sources in the IRW, apart 09:13AM
21 from poultry, of E. coli?

22 A No, I have not.

23 Q Okay. Of Enterococci?

24 A No, I have not.

25 Q Campylobacter? 09:13AM

14

1 A No.

2 Q Salmonella?

3 A No.

4 Q Any other bacteria?

5 A No.

09:13AM

6 Q Have you undertaken yourself to quantify fecal
7 production levels by any animal in the IRW?

8 A No, I have not.

9 Q Have you undertaken quantification of bacteria
10 loading from any particular source in the IRW?

09:13AM

11 A I have not.

12 Q Now, you submitted a journal article to the
13 Journal of Applied and Environmental Microbiology;
14 correct?

15 A That's correct.

09:14AM

16 Q And we were provided a copy of that a couple
17 of days ago. You're on the editorial board of that
18 journal?

19 A That's correct.

20 Q Okay. Have you discussed your article with
21 any of your colleagues on that board?

09:14AM

22 A No, I have not. That wouldn't be -- you don't
23 do that.

24 Q Okay. You submitted it on June 11, at least
25 according to the cover E-mail; is that correct?

09:14AM

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